**3GPP TSG-RAN2 Meeting #117- e R2-22xxxxx**

**e-Meeting, xxx, 2022**

**Source: email discussion Rapporteur (ZTE Corporation)**

**Title: CP open issues list for SDT (email: [POST116bis-e][511])**

**Agenda item:** **xxx**

**Document for:** **Discussion and Decision**

# Introduction

This document contains summary of open issues and proposed resolutions for CP aspects of SDT:

* [POST116bis-e][511][Sdata] CP open issues (ZTE)

Scope:

- List of critical open issues to be resolved for WI completion (including UE capabilities)

- Updated CR 38.331 for information and review

NOTE: NO contributions on these critical open issues are expected

Deadline:

- Open issues list Jan. 28th

- Company inputs Feb. 14th

Proposed format for comments is as below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/PreferenceCompanies can use company ID and enter comment (see example) | Proposed resolution (to be updated by Rapporteur) |
| Zxxx | XXX is missing/wrong/open etc | Essential | ZTE: We think this is not neededXXX: We agree with YYY etc | Rapp: Will be implemented in the next revision |

# Discussion

## Procedural open issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z001 | Field descriptions missing for some IEs | Essential |  | Rapp: Will be implemented in the next revision |
| Z002 | Running CR is not against the latest RRC spec version  | Essential |  | Rapp: Will be updated in the next revision |
| Z013 | Align the parameter names between MAC and RRC specs | Essential |  | Rapp: To be done before/during next meeting |
| Z019 | SDT specific RACH configuration is missing | Essential |  | Rapp: This will be part of the common RACH partitioning CR and hence all SDT related agreements (both in RAN2 and RAN1 – see the L1 params for SDT) would have to be included in that CR.  |

## UE capabilities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z003 | To support Rel-17 SDT mechanism, whether UE shall always support RA-SDT (i.e. a UE supporting CG-SDT shall also support RA-SDT) | Essential |  |  |
| Z004 | whether to define a new UE capability for RA-SDT as ‘optional with capability signalling’, per UE and without a need of xDD and FRx differentiation | Essential |  |  |
| Z005 | whether To define a new UE capability for CG-SDT as ‘optional with capability signalling’, per UE and without a need of xDD and FRx differentiation | Essential |  |  |
| Z006 | Any pre-Rel-17 features (e.g. 2-step RACH or SUL) requires additional/separate UE capabilities when used in combination to Rel-17 SDT mechanism | Essential |  |  |
| Z007 | Whether to indicate bandwidth, and the supported MIMO layers within UE´s capabilities related to SDT | Essential |  |  |
| Q001 | Whether to define a separate UE capability for resuming/transmitting SRB (control data, NAS message) for Rel-17 NR SDT in RRC\_INACTIVE | Essential |  |  |
| H004 | Whether to have a separate capability for multiple configured/active configured grants for SDT | Essential | Since CG design over SDT is different from legacy CG desing (e.g. using mapping between CG and SSBs), we think there should be a separate UE capability to tell whether multiple CG configurations over SDT are supported by the UE. |  |

## CP/RRC open issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z009 | Editor’s Note: FFS on SDT TAT and its interaction with the normal TAT and a separate section to capture the release of CG-SDT resources upon receiving such request from lower layers | Essential | Rapp: Seems we made a few more agreements on this. Wait for the MAC spec to be finalized and then we can capture corresponding procedure in RRC if needed.  |  |
| Z010 | TBD whether the expiry of the new SDT timer related actions can be integrated into section 5.3.13.5 or not | Essential | Rapp: Propose to integrate as currently in the running CR (i.e. remove the EN in 5.3.13.5) |  |
| Z011 | How to suppress RNAU whilst SDT is ongoing? | Essential | Rapp: Propose to add a condition that RNAU is only initiated if neither T319 nor Txxx are running (see running CR – section 5.3.13.8). Alternative is to add a note to capture this. Both can work – comments welcome.[Intel] We support the intention of the TP however we suggest avoiding the word “neither” in an IF condition and the check for legacy T319 in relation to the new SDT operation. We suggest updating the related TP as follow: “if ~~neither T319 nor~~ Txxx(NewSDTTimer) is not ~~are~~ running:”[Huawei] We agree with the comment from Intel. We should not modify legacy behaviour and focus only on SDT operation, as per the agreement. |  |
| Z012 | RRCReject handling | Essential | Rapp: Propose to follow same procedure as legacy (which is also the case in EDT). [Huawei] Please see H004, we think we cannot reuse legacy behaviour 1:1 when the UE is configured with CG-SDT. |  |
| Z014 | Is Logged measurement procedure (5.5a) applicable during SDT | Optional | Rapp: Propose to not support this |  |
| Z015 | Are Idle/inactive measurements continued during SDT (5.7.8) | Optional | Rapp: Propose to not support this  |  |
| Z016 | What are the values for sdt-DataVolumeThreshold | Essential |  |  |
| Z017 | What are the values for txxx (newSDTTimer) | Essential | **[Intel] [Potentially new issue needed]** We suggest discussing whether this as well as other SDT related configurations are all defined following delta configuration |  |
| Z018 | Should DataVolumeThreshold be also configured in SIB1? Should this be only configured in SIB1 and not in RRCRelease? | Optional | Rapp: Think UE specific signalling (in RRCRelease) is sufficient. **[Intel]** We understand that this issue should be marked for discussion as it does not seem an optimization [Rapp] Marked as optional (i.e. not essential for the feature to work, but happy to add based on the support level… Issue is open for comments |  |
| Z020 | sdt-SSB-PerCG-PUSCH-r17 ENUMERATED {one, two, four, eight,sixteen} FFS from RAN1 on {1/8,1/4,1/2}  | Essential |  | Rapp: wait for RAN1 input |
| Z021 | Configuration of common search space for SDT is open | Essential |  | Rapp: This shold be part of common RACH partitioning CR.  |
| Z023 | Do we need to discard PDCP SDUs of SRBs upon reception of RRCRelease with SDT config? | Essential | **[Intel]** Considering latest agreements, we understand that the FFS is only for SRBs:*“2. For DRBs configured with SDT, PDCP suspend is performed upon reception of RRCRelease message including suspendConfig so that PDCP PDUs are discarded, and PDCP SDUs already stored are considered in SDT data volume calculation. No specification change is needed.* *16. FFS for SRBs, whether to discard PDCP SDUs upon reception of RRCRelease message including suspendConfig*”*[Rapp] Agree! Updated.*  |  |
| Z024 | How to support delta signalling for CG-SDT?Option 1: Delta signalling is based on configuration in BWP-dedicated for initial BWO in connected modeOption 2: Delta signalling is based on the previous SDT configuration (i.e. only applicable to SDT operation and will be released when the UE moves to connected)If we want to support option 1, we need to clarify the relation between the configuration in connected mode and the configuration in SDT for the CG type 1 resources. (e.g. are the CG type 1 resources in SDT valid also in connected? Will the PDCCH/PDSCH configuration impact the connected mode configuration? Etc. this also needs to be clarified in case of cell change. It seems option 2 is simpler. Companies can comment.  | Essential | **[Intel]** Regarding the Z024 question here and the proposed option 1 & 2, we understand we should follow legacy delta operation which is aligned to the description in option 2. We understand that option 1 is an optimization and there might not be time to discuss the correspondign implications considering that there is only 1 meeting left to complete the WI.**[Intel] [Potentially new issue needed]** We see beneficial to support delta configuration for both RA-SDT and CG-SDT understanding that UE could also initiate RA-SDT procedure in same cell where the UE AS Context is stored large number of times. Therefore if there is no technical concern, we suggest changing all SDT related confirmations to “need M” (including e.g. the parameters defined in *SDT-Config*). **[Intel] [Potentially new issue needed]** Dedicated configuration should avoid using “need S”, we suggest updating it to follow the delta configuration. sdt-DRB-List-r17 SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity OPTIONAL, -- Need S[Rapp] Let us discuss overall delta signallling framework here. ASN.1 issues like above can be fixed directly in the running CR (otherwise the issue list may be huge).  |  |
| Z025 | In case of SDT, carrier selection is performed before selecting the CG resource. For this, we use *sdt-RSRP-ThresholdSSB-SUL.* However, it is unclear how this IE is configured. Is it configured commonly to all RACH partitions? Or is it configured separately for SDT (e.g. in SDT-ConfigCommonSIB)? If it is configured separately for SDT, then the carrier should be selected before SDT is initiated and the selected carrier should be informed to MAC (e.g. for RACH partition selection). * Note this may be some how related to RACH partition discussion too.
 | Essential |  |  |
| X001 | It is not clear how the RACH failure in the subsequent SDT phase is handle, according to our paper [R2-2201378](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2201378.zip). | Essential | Xiaomi: Propose to let the UE enter RRC\_IDLE as the handling of other failures during the subsequent SDT phase.According to the RAN2#115-e meeting discussion, RAN2 made the following agreements to handle various connection failure during the ongoing SDT session:* Events that trigger a termination or failure of an ongoing SDT session 1) cell reselection, 2) expiry of the SDT failure detection timer, 3) the UE does when Max retx is reached in RLC. RLC AM max retransmission functionality remains unchanged.
* When a UE detects a failure of an ongoing SDT session, UE transitions autonomously into RRC\_IDLE (as baseline solution). If time allows or have a ready solution we can consider further optimizations.

[Rapp] Understanding is that any such error would lead to transition to IDLE mode. This can be clarified.  |  |
| X002 | The detailed issue is provided in our paper R2-2201376.According to the running RRC CR, when the value of “sdt-DRB-ContinueROHC” is set to “rna”, the cell for ROHC continuity belongs to the RNA, in which the RRCRelease message has to be transmitted via a cell of this RNA. According to the running RRC CR, when the value of “sdt-DRB-ContinueROHC” is set to “cell”, the cell for ROHC continuity is where the UE receives the RRCRelease message.However, according to the legacy procedure, the cell where the RRCRelease message is transmitted may not be the RNA cell. The RRCRelease message with segments can be transmitted via more than one cells. | Optimisation | Xiaomi: We have the following proposals:The cell where the ROHC continuity is applied is indicated via an explicit cell identity in RRCRelease message.The RNA where the ROHC continuity is applied is the same RNA as indicated via ran-NotificationAreaInfo in RRCRelease message, same as legacy.[Rapp] Looks like an optimisation since the UE should know which cell it is connected to when receiving the RRCRelease message. Companies can comment |  |
| E001 | Introduction of Release Assistance Information (RAI) for SDT. | Essential? | As discussed in previous contributions e.g. [R2-2200811](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200811.zip) and [R2-2200727](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200727.zip), some sort of assistance information to help network to decide whether to release the UE is necessary for efficient implementation of SDT. One option is to have EDT as base-line for the discussion/decision. RRC or MAC could be used for this.[Huawei]: We agree this is essential for the network to operate SDT properly, not only to know when to release the UE but also to make a decision on whether to relocate the anchor or not. We agree EDT RAI can be reused to a large extent with the main difference being that subsequent transmissions are allowed in NR so the UE could additionally indicate whether single/multiple packets are expected.[Rapp] Can discuss, but it is not clear why it is essential for the feature to work.  |  |
|  |  |  | [Rapp] Agree with the issue but it is duplicate of Z017 above.  |  |
| E003 | What are the values for CG-SDT periodicity | Essential | In the discussion RAN2 concluded that here is no restriction on the candidate values of CG period. In NR connected mode, the maximum periodicity configurable for CG Type 1 is 640ms. It can be assumed that longer values are needed to cover additional use cases such as those that were considered for e.g. LTE-PUR (up to minutes, hours)[Rapp] I am assuming RAN1 will come with these values since we indicated no restriction from our side??  | [Rapp] Wait for RAN1 input |
| NEC001 | Based on R2-2109308 Reply LS from CT1 on non-SDT arrivaling “if new UL data or NAS message becomes available for which non-SDT radio bearers are not established, the current behaviour (of NAS in 5GMM\_CONNECTED mode with inactive indication) applies, i.e. any new pending UL data associated with a PDU session with no suspended user plane resources, will require the Service Request procedure to be initiated and NAS will need to provide UAC parameters based on the reason for that Service Request.” And according to the 38.331, if UE receives UAC parameters, the UE shall performs UAC. The issue is if the UE need to indicate arrivaling of access attempt of the non-SDT data is barred. | Essential? | [NEC] we think If the access attempt for the new UL data is barred, there is no need to indicate the non-SDT arrival to the network. Otherwise the network may transmit RRC setup/resume to the UE, but there is no non-SDT data allowed to be transmitted.[Rapp] Related to the CT1 LS. Wait for the input from CT1.  |  |
| Q002 | CG resource request message. UE is allowed to request or indicate the preferred CG resource to network regarding the CG resource configuration. | Essential? | [QC] Indicate UE preferred CG resource to network so that network is able to configure tha appropriate CG resource configuration to UE. Could be either RRC or MAC message or reusing UAI framework.[Huawei]: We agree such knowledge is essential for the network to provide the UE with a properly configured CG-SDT resources. We can reuse the structure from PUR and it can be put, e.g. in UE Assistance info as mentioned by QCM.[Rapp] okay to disucss, but it is not clear that this is essential feature.  |  |
| H002 | RAN 3 during RAN3#114 e discussed how to handle the DL non-SDT data/signalling arrival during SDT procedure. During this discussion they also considered how to trigger UE to re-initiate another RRC Resume procedure, two possible options were discussed in RAN3:- Option 1: Use RAN paging to trigger the following-up RRC resume procedure after UE is moved to Inactive state.- Option 2: Add specific cause value or Indication in RRCRelease message to indicate UE to trigger the follow-up resume procedure.- Option 3: Release with redirection to be used (i.e. the anchor gNB can release the UE and indicate redirection to the target gNB so that the UE immediately preforms new resume without need for paging).  | Essential | Option 2 has a clear advantage that it can1. Eliminate false paging for the other UEs within the cell or RNA and hence is in line with the enhanced powersaving work item which reduces the false paging
2. Eliminates the need to for the anchor/ last serving gNB to to perform paging.
3. Reduces the latency to transfer critical DL non-SDT data by bypassing the paging procedure.

Considering these advantages and very minor update required to include the indication in the RRCRelease message, option 2 should be adopted for the handling DL non-SDT data/signalling arrival during on going SDT procedure while anchoring. So that the UE can initiate a new resume procedure right-away.[Rapp] Ideally we should wait for RAN3 input on this. But if companies want to discuss, then I have added one more option (which needs no changes to the current release message).  |  |
| H003 | When the UE is configured with SDT Configuration, only non time critical procedures such as UE initiated LCS can be transferred while the UE remains in RRC\_INACTIVE. For the transmission of other type of time critical NAS messages such as emergency call establishment, PDU session establishment/ modification, the UE should first transition to RRC\_CONNECTED state and then transfer these NAS Message in RRC\_CONNECTED State.When the UE is configured with SDT Configuration, the NAS layer needs to indicate to RRC layer whether the UL NAS message can be transmitted in RRC\_INACTIVE state or not. | Essential  | When the UE is configured with SDT Configuration, Time critical NAS procedures signaling such as emergency call establishment, MO-MMTEL-voice/video-call initiation, establishment/modification of a new/existing PDU session, should not be initiated using SDT Mechanism in INACTIVE State as the SDT procedure will have to be terminated and the UE will have to be transitioned to RRC\_CONNECTED State in the middle of the NAS procedure followed by a RRCReconfiguration procedure needed for DRB establishment/ reconfiguration which will cause additional delay that will not be acceptable for high priority call such as an emergency call.Furthermore, if these time critical NAS procedure is initiated using RACH based SDT procedure and if the last gNB decides to anchor the SDT session, the last serving gNB will then have to release the UE to RRC INACTIVE and the whole NAS procedure will have to be started again in the receiving gNB from the beginning after the UE context is relocated from the last serving gNB.[Rapp] Can discuss. But if SRB2 is configured then NAS procedures will be allowed and if it is not configured, then non-SDT data indication will be needed. So, seems nothing more is needed.  |  |
| H004 | How to handle CG-SDT configuration upon RRCReject reception  | Optimisation? | Currently, MAC reset will be performed when UE receives RRCReject. Then, CG-SDT configurations will be released if we consider the cg-sdt-TAT to be expired, but that is not necessary, so the behaviour upon RRCReject reception should be modified to allow the UE to keep CG-SDT configuration as it can be still valid for the next resume attempt.[Rapp]: Seems optimization (since UE Can use RA-SDT anyway for next resume). CG is not mandatory. But companies can comment on the proposed option. [NEC] We have concerned on the security key reuse issue.After reception of RRCRecject during SDT, if UE initiates a second RRC Resume procedure later in the same cell, the same security key will be generated and PDCP COUNT value will be reset, but the packtes can be different. However, ciphering different packtets using same key same COUNT value is not allowed. At RAN2 #115e, in EDT session, it was agreed that “RAN2 assumes that UE should avoid a consecutive EDT or PUR transmission with a different payload but same security key”. So we also need to address this issue in SDT. |  |
| H005 | It needs to be clarified in specs which of the configurations stored in UE AS INactive context the UE uses when performing SDT | Essential | At least PDCP and RLC contexts have to be used, but we also agreed to reuse some MAC level configuration, e.g. LCH restrictions. |  |
| H006 | How to configure CG to LCH mapping restrictions for SDT. | Essential | For LCH restrictions, it should also be clarified that at least LCH to CG mapping from inactive context cannot be used and we should have a separate LCH to CG mapping for SDT.It may also be handled as part of UP issues.[Rapp] please see the current implementation in the running CR and comment.  |  |
| H007 | How is the RSRP used for SDT threshold evaluation derived exactly. | Essential | Clarify that cell level RSRP of the downlink pathloss reference, as specified in TS 38.331 section 5.3.3.3, is used (a) to select between SDT and non-SDT procedure and; (b) to select an UL carrier for SDT transmission.[Rapp] should this be in MAC or RRC? |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Conclusion and proposals

# References

1. R2-2201664, Report for Rel-17 Small data, URLLC/IIoT and RACH partitioning

# Annex (contact details for email discussions)

|  |  |  |
| --- | --- | --- |
| Company | Contact name | Contact email |
| Xiaomi | Yumin Wu | wuyumin@xiaomi.com |
| Intel | Marta Martinez Tarradell | marta.m.tarradell@intel.com |
| NEC | Wang Da | wangda@labs.nec.cn |
| Qualcomm | Ruiming Zheng | rzheng@qti.qualcomm.com |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |